



Operating Test Requirements

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Developing Scenarios and JPMs

- Ensure the test can differentiate between those applicants who can safely operate the plant and those who cannot.
- Test items should include the three facets of test validity:
 - Content
 - Operation
 - Discrimination



Parts

- Walk-through
 - Focuses on specific K/As required for licensed operators to safely discharge their assigned duties and responsibilities
 - Consists of 2 parts:
 - Administrative Topics
 - Control Room/In-Plant Systems
- Simulator Test



Developing the Operating Test

- Walk-through and simulator should not:
 - Be redundant
 - Duplicate material covered on the written exam

Duplication and redundancy can be precluded by developing and reviewing both the written and operating tests as a package.

The Operating Test



Timeline Requirements

- 120 Days – 120 day letter
- 90 Days – References to the NRC if NRC is writing the exam
- 75 Days – Outline submittal

Facility: _____		Date of Examination: _____
Developed by: Written - Facility <input type="checkbox"/> NRC <input type="checkbox"/> // Operating - Facility <input type="checkbox"/> NRC <input type="checkbox"/>		
Target Date*	Task Description (Reference)	Chief Examiner's Initials
-180	1. Examination administration date confirmed (C.1.a; C.2.a and b)	
-120	2. NRC examiners and facility contact assigned (C.1.d; C.2.e)	
-120	3. Facility contact briefed on security and other requirements (C.2.c)	
-120	4. Corporate notification letter sent (C.2.d)	
[-90]	[5. Reference material due (C.1.e; C.3.c; Attachment 3)]	
{-75}	6. Integrated examination outline(s) due, including Forms ES-201-2, ES-201-3, ES-301-1, ES-301-2, ES-301-5, ES-D-1's, ES-401-1/2, ES-401-3, and ES-401-4, as applicable (C.1.e and f; C.3.d)	
{-70}	{7. Examination outline(s) reviewed by NRC and feedback provided to facility licensee (C.2.h; C.3.e)}	
{-45}	8. Proposed examinations (including written, walk-through JPMs, and scenarios, as applicable), supporting documentation (including Forms ES-301-3, ES-301-4, ES-301-5, ES-301-6, and ES-401-6, and any Form ES-201-3 updates), and reference materials due (C.1.e, f, g and h; C.3.d)	
-30	9. Preliminary license applications (NRC Form 398's) due (C.1.i; C.2.g; ES-202)	
-14	10. Final license applications due and Form ES-201-4 prepared (C.1.i; C.2.i; ES-202)	
-14	11. Examination approved by NRC supervisor for facility licensee review (C.2.h; C.3.f)	



Include with Outline Submittal

- ES 201-2, Examination Outline Quality Checklist
 - The written exam blocks can be N/A'd
- ES 201-3, Examination Security Agreement
- ES-D1-1, Scenario Outlines

Facility: _____	Scenario No.: _____	Op-Test No.: _____
Examiners: _____ _____	Operators: _____ _____	
Initial Conditions: _____ _____ _____		
Turnover: _____ _____ _____		

Event No.	Malf. No.	Event Type*	Event Description

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor



Include with Outline Submittal

- ES 301-1, Administrative JPM Outline
- ES 301-2, Control Room/In-Plant Systems Outline
- ES-301-5, Transient and Event Checklist
- ES-301-6, Competencies Checklist ES 301-6



ES-301-1

Administrative JPM Outline

Administrative Topics

Covers K/As that are generally associated with administrative control of the plant.

Topic	Number of Subjects	
	RO	SRO and RO Retakes
"Conduct of Operations"	1 (or 2)	2
"Equipment Control"	1 (or 0)	1
"Radiation Control"	1 (or 0)	1
"Emergency Procedures/Plan"	1 (or 0)	1
Total	4	5



“Conduct of Operations”

- Evaluates the applicant’s knowledge of the daily operation of the facility
- Includes:
 - Shift turnover
 - Shift staffing requirements
 - Temporary modifications of procedures
 - Reactor plant startup requirements
 - Mode changes



“Conduct of Operations”

- Includes:
 - Plant parameter verification
 - Estimated critical position (ECP)
 - Heat balance
 - Short-term information
 - Night orders
 - Standing orders
 - Key control
 - Security (awareness and familiarity)
 - Fuel handling



“Equipment Control”

- Addresses the administrative requirements associated with managing and controlling plant systems and equipment.
- Includes:
 - Surveillance testing
 - Maintenance
 - Tagging and clearances
 - Temporary modification of systems
 - Familiarity with and use of piping and instrument drawings



“Radiation Control”

- Evaluates the applicant’s knowledge and abilities with respect to radiation hazards and protection (of plant personnel and the public).
- Includes:
 - Use and function of portable radiation and contamination survey instruments and personnel monitoring equipment
 - Knowledge of significant radiation hazards



“Radiation Control”

- Includes:
 - The ability to perform procedures to reduce excessive levels of radiation and to guard against personnel exposure
 - Radiation exposure limits and contamination control, including permissible levels in excess of those authorized
 - Radiation work permits
 - Control of radiation releases



“Emergency Plan”

- Evaluates the applicant’s knowledge of the facility’s emergency plan, including (as appropriate):
 - The responsibility of the RO or SRO to decide whether the plan should be executed
 - Duties assigned under the plan



“Emergency Plan”

- Includes
 - Lines of authority during an emergency
 - Emergency action levels and classifications
 - Emergency facilities
 - Emergency communications
 - Emergency protective action recommendations

Requirements

- SROs
 - 5 administrative JPMs
 - Must sample all topics
- ROs
 - 4 administrative JPMs
 - “Conduct of Operations” is required

Topic	Number of Subjects	
	RO	SRO and RO Retakes
“Conduct of Operations”	1 (or 2)	2
“Equipment Control”	1 (or 0)	1
“Radiation Control”	1 (or 0)	1
“Emergency Procedures/Plan”	1 (or 0)	1
Total	4	5



ES-301-2

Control Room/In-Plant Systems Outline

Control Room/In-Plant Systems

- Used to determine whether the applicant has an adequate knowledge of plant system design and is able to safely operate those systems

ES-301		Control Room/In-Plant Systems Outline		Form ES-301-2	
Facility: _____				Date of Examination: _____	
Exam Level: RO <input type="checkbox"/> SRO-I <input type="checkbox"/> SRO-U <input type="checkbox"/>				Operating Test No.: _____	
Control Room Systems® (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)					
System / JPM Title			Type Code*	Safety Function	
a.					
b.					
c.					

Control Room/In-Plant Systems

In-Plant Systems® (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
i.		
j.		
k.		
@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.		
* Type Codes	Criteria for RO / SRO-I / SRO-U	
(A)lternate path	4-6 / 4-6 / 2-3	
(C)ontrol room		
(D)irect from bank	$\leq 9 / \leq 8 / \leq 4$	
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$	
(EN)gineered safety feature	- / - / ≥ 1 (control room system)	
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$	
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$	
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)	
(R)CA	$\geq 1 / \geq 1 / \geq 1$	
(S)imulator		

RO and SRO-Instants

- Each of the control room systems and evolutions (and separately, each of the in-plant systems and evolutions) should evaluate a different safety function
- The same system or evolution should not be used to evaluate more than one safety function in each location.

License Level	Control Room	In-Plant	Total
RO	8	3	11
SRO-instant (I)	7	3	10
SRO-upgrade (U)	2 or 3	3 or 2	5

SRO-Upgrades

- The five systems and evolutions selected for an SRO-U applicant should evaluate at least five different safety functions.
- One must be an engineered safety feature.
- The same system or evolution should not be used to evaluate more than one safety function.

License Level	Control Room	In-Plant	Total
RO	8	3	11
SRO-instant (I)	7	3	10
SRO-upgrade (U)	2 or 3	3 or 2	5

Specific Instructions

- Tasks related to a shutdown or low-power condition:
 - At least 1
- Tasks requiring applicants to execute alternative paths within the facility's operating procedures:
 - 4-6 for ROs and instant SROs
 - 2-3 of the tasks for upgrade SROs

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	$\leq 9 / \leq 8 / \leq 4$
(E)mergency or abnormal in-plant	$\geq 1 / \geq 1 / \geq 1$
(EN)gineered safety feature	- / - / ≥ 1 (control room system)
(L)ow-Power / Shutdown	$\geq 1 / \geq 1 / \geq 1$
(N)ew or (M)odified from bank including 1(A)	$\geq 2 / \geq 2 / \geq 1$
(P)revious 2 exams	$\leq 3 / \leq 3 / \leq 2$ (randomly selected)
(R)CA	$\geq 1 / \geq 1 / \geq 1$
(S)imulator	

Specific Instructions

- Tasks requiring emergency or abnormal condition actions:
 - At least 1
- Tasks requiring RCA entry
 - At least 1

* Type Codes	Criteria for RO / SRO-I / SRO-U
(A)lternate path	4-6 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥ 1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Simulator Operating Test



Simulator Operating Test

- The most performance based aspect of the operating test
- Used to evaluate the applicant's ability to safely operate the plant's systems under dynamic, integrated conditions



Development

- Scenario sets are constructed by:
 - Selecting and modifying scenarios from existing banks
 - Facility licensee banks
 - NRC banks
 - Developing new scenarios



Development

- The initial conditions, normal operations, malfunctions, and major transients should be varied among the scenarios and should include startup, low-power, and full-power situations.



Development

- Review the associated walk-through outline, if it has already been prepared
- Take care not to duplicate operations that will be tested during the systems walk-through portion



What is Required

- Every RO applicant should have a total of 6:
 - Instrument/component malfunctions
 - Normal, or
 - Reactivity manipulations
- These should be split between the RO and BOP positions.



What is Required

- This can be a combination of:
 - Instrument/Component Failures (4)
 - Reactivity Manipulation (1)
 - Normal Evolutions (1)
- These events should all be prior to the Major Malfunction
- Only one applicant can get credit for a reactivity manipulation or a normal per scenario.



What is Required – SRO-Instant

- Must have two Technical Specification calls as the SRO
- Must stand the RO position
 - Must have two instrument/component malfunctions
 - Must have a Major Transient.



What is Required – SRO-Upgrade

- Must have two Technical Specification calls, the same instrument/component malfunctions, and a Major Transient.
- Only required to be observed in one scenario

Verifiable Actions



Requirements

- Form ES-301-5 “Transient and Event Checklist”
 - Each scenario must require the applicant to respond to specified evolutions, failures, TS evaluations and transients
 - ES-301-5 gives the required minimum number of responses of each for an applicant’s license level
- Credit is only given for events with verifiable actions that provide insight to the applicant’s competence.



Requirements

- The required instrument and component failures should normally be completed before starting the major transient.
- Events that do not require an operator to take one or more substantive actions will not count toward the minimum number of events required for each operator per Form ES-301-5.

Form ES-301-3

Operating Test Quality Checklist

“It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level.”

ES-301		Operating Test Quality Checklist			Form ES-301-3		
Facility:		Date of Examination:		Operating Test Number:			
1. General Criteria				Initials			
				a	b*	c#	
a.	The operating test conforms with the previously approved outline; changes are consistent with sampling requirements (e.g., 10 CFR 55.45, operational importance, safety function distribution).						
b.	There is no day-to-day repetition between this and other operating tests to be administered during this examination.						
c.	The operating test shall not duplicate items from the applicants' audit test(s). (see Section D.1.a.)						
d.	Overlap with the written examination and between different parts of the operating test is within acceptable limits.						
e.	It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level.						

Form ES-301-4

Simulator Scenario Quality Checklist

“The level of difficulty is appropriate to support licensing decisions for each crew position.”

ES-301		Simulator Scenario Quality Checklist			Form ES-301-4		
Facility: _____ Date of Exam: _____ Scenario Numbers: / / Operating Test No.: _____							
QUALITATIVE ATTRIBUTES					Initials		
					a	b*	c#
1.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.						
10.	Every operator will be evaluated using at least one new or significantly modified scenario. All other scenarios have been altered in accordance with Section D.5 of ES-301.						
11.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).						
12.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form with the simulator scenarios).						
13.	The level of difficulty is appropriate to support licensing decisions for each crew position.						

Appx D

Simulator Testing Guidelines

Every required operator action should be included on Form ES-D-2; this is particularly important for the critical tasks and other verifiable actions and behaviors that will provide a useful basis for evaluating the operators' competence.

Appendix D		Required Operator Actions	Form ES-D-2
Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page ____ of ____			
Event Description: _____ _____ _____			
Time	Position	Applicant's Actions or Behavior	

Examples of Submitted Malfunctions



APRM Failure High

- Credit given on ES-D-1 for:
 - ATC Operator – Instrument malfunction
 - SRO – TS
- Verifiable actions for the ATC
 - Announces "APRM Hi/Inop/Trip" and "Rod withdrawal block" alarms
 - Consults ARP
 - Determines that APRM 1 has critical self test fault
- SRO Directs bypassing APRM 1

What are the substantive actions that provide insight to the applicants' competence for this event?



FCV-2210Y Fails Closed

- Prior to the event:
 - Boration for downpower in progress
 - Boric acid flow goes to full scale low
 - No associated alarms
- Credit given on ES-D-1 for:
 - RO - Instrument malfunction
- Verifiable actions for the RO
 - Recognizes FCV-2210Y is closed and boric acid flow is lost.
 - No immediate response required. Manually controls boric acid flow using V2514 and BAM pumps as directed per step 6.0.9 of 2-ONP-02.01, "Boron Concentration Control".

CEA # 59 slipped > 15" (not dropped)

- Verifiable action(s) for the RO?
 - Place CEDMCS control panel in off as directed by SRO
 - Determine operability IAW Appendix
 - Recover CEA IAW Appendix
 - Resume power ascension when directed



Examples with substantive actions

- Pressurizer Main Spray controller fails high
 - Causes the main spray valve to fully open
 - RO must take manual control of Pressurizer pressure
- 3A Recirc pump speed control fails high and the crew will not be able to lower the speed
 - Respond per the AOI
 - Must trip the pump.

What are substantive action requirements?

- Time dependent actions by the operator
 - Repercussions if actions are not taken in a timely manner
 - Similar to operator immediate actions
- Requires manipulation of the system, not just alarm acknowledgement
- The operator must take action without outside aid (Minimal or no SRO direction given)



How do I know if I'm hitting the mark?

If the applicant does nothing in response to the event, will anything happen to the plant?

If the answer is “no” because the plant will take care of itself – the event **may** not provide insight to the applicant's competence.



How do I know if I'm hitting the mark?

If the applicant does nothing in response to the event, will anything happen to the plant?

On the other hand...

Events requiring an applicant to demonstrate some knowledge or skill while following a procedure that recovers or realigns may still work even if there is no immediate consequence to the plant



Additional items to consider

- Improve the quality of existing malfunctions
 - Change instantaneous failures to slow failures to change the plant response and operator interaction
- Create new malfunctions